AMENDMENTS TO THE CLAIMS

Claims 1-82 were filed originally and claims 31-35 and 47-53 were previously canceled as being directed to non-elected claims. Thus, claims 1-30, 36-46, and 54-82 were pending at the time of the Action.

Claims 7-8, 25-26, 38-39, 54-61, 66-70, and 72-82 are canceled.

Claims 1, 9, 11-13, 17, 20, 27, 36, 40, 42-44, and 62-65 are amended.

Accordingly, claims 1-6, 9-24, 27-30, 36-37, 40-46, 62-65, and 71 remain pending.

1. **(Once Amended)** A method comprising:

transforming frames in a video sequence using a wavelet transform and motion information between frames to produce multiple sub-bands of coefficients; ~~and~~

coding the coefficients of each sub-band independently bit-plane by bit-plane using different coding primitives, wherein the coding primitives comprise:

zero coding to code new information about a coefficient that is not yet significant in a previous bit-plane; and

sign coding to code a sign of the coefficient once the coefficient is deemed significant.

2. **(Original)** A method as recited in claim 1, wherein the wavelet transform comprises a shape-adaptive discrete wavelet transform.

3. **(Original)** A method as recited in claim 1, wherein the transforming comprises performing a temporal 1-D wavelet transform along motion trajectories in a temporal direction.

4. **(Original)** A method as recited in claim 1, wherein the transforming comprises:

performing a temporal wavelet transform on corresponding pixels in a video object along motion trajectories in a temporal direction to produce frames of temporal wavelet coefficients; and

performing a spatial wavelet transform on the frames of the temporal wavelet coefficients to produce multiple sub-bands of wavelet coefficients.

5. **(Original)** A method as recited in claim 1, wherein the coding produces multiple bitstreams, one for each sub-band, and further comprising forming a bitstream from the multiple bitstreams.

6. **(Original)** A method as recited in claim 1, wherein the coding comprises transposing selected sub-bands.

7. **(Canceled)**

8. **(Canceled)**

9. **(Once Amended)** A method ~~as recited in claim 7,~~ comprising:

transforming frames in a video sequence using a wavelet transform and motion information between frames to produce multiple sub-bands of coefficients;

coding the coefficients of each sub-band independently bit-plane by bit-plane using different coding primitives, wherein the coding primitives comprise:

zero coding to code new information about a coefficient that is not yet significant in a previous bit-plane;

sign coding to code a sign of the coefficient once the coefficient is deemed significant; and

magnitude refinement to code new information of a coefficient that has already become significant in the previous bit-plane.

10. **(Original)** A method as recited in claim 1, wherein the coding comprises assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples.

11. **(Once Amended)** A method ~~as recited in claim 10,~~ comprising:

transforming frames in a video sequence using a wavelet transform and motion information between frames to produce multiple sub-bands of coefficients;

coding the coefficients of each sub-band independently by assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples;

wherein the sub-bands include an LLL (low-low-low) sub-band and an LLH (low-low-high) sub-band and the contexts are assigned as follows:

LLL and LLH Sub-bands				
h	**v**	**a**	**d**	**Context**
2	x	x	x	0
1	≥1	x	x	0
1	0	≥1	x	1
1	0	0	x	2
0	2	0	x	3
0	1	0	x	4
0	0	≥1	x	5
0	0	0	3	6
0	0	0	2	7
0	0	0	1	8
0	0	0	0	9

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors that are significant and $0<v<2$, "a" represents a number of immediate temporal neighbors that are significant and $0<a<2$, and "d" represents a number of immediate diagonal neighbors that are significant and $0<d<12$.

12. **(Once Amended)** A method ~~as recited in claim 10,~~ comprising:

transforming frames in a video sequence using a wavelet transform and motion information between frames to produce multiple sub-bands of coefficients;

coding the coefficients of each sub-band independently by assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples;

wherein the sub-bands include an LHH (low-high-high) sub-band and the contexts are assigned as follows:

LHH Sub-band			
h	**v+a**	**d**	**Context**
2	x	x	0
1	≥3	x	0
1	≥1	≥4	1
1	≥1	x	2
1	0	≥4	3
1	0	x	4
0	≥3	x	5
0	≥1	≥4	6
0	≥1	x	7
0	0	≥4	8
0	0	x	9

where "h" represents a number of immediate horizontal neighbors that are significant and 0<h<2, "v" represents a number of immediate vertical neighbors that are significant and 0<v<2, "a" represents a number of immediate temporal neighbors that are significant and 0<a<2, and "d" represents a number of immediate diagonal neighbors that are significant and 0<d<12.

13. **(Once Amended)** A method ~~as recited in claim 10,~~ comprising:

transforming frames in a video sequence using a wavelet transform and motion information between frames to produce multiple sub-bands of coefficients;

coding the coefficients of each sub-band independently by assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples;

wherein the sub-bands include an HHH (high-high-high) sub-band and the contexts are assigned as follows:

d	h+v+a	Context
≥6	x	0
≥4	≥3	1
≥4	x	2
≥2	≥4	3
≥2	≥2	4
≥2	x	5
≥0	≥4	6
≥0	≥2	7
≥0	1	8
≥0	0	9

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors that are significant and $0<v<2$, "a" represents a number of immediate temporal neighbors that are significant and $0<a<2$, and "d" represents a number of immediate diagonal neighbors that are significant and $0<d<12$.

14. (Original) A method as recited in claim 1, further comprising truncating a number of bits in each bit-plane according to rate-distortion curves.

15. (Original) A method as recited in claim 1, further comprising estimating motion trajectories of pixels in a video object from frame to frame in the video sequence and said transforming is performed on corresponding pixels along the motion trajectories.

16. **(Original)** A computer-readable medium comprising computer-executable instructions that, when executed by one or more processors, perform the method as recited in claim 1.

17. **(Once Amended)** A method comprising:

estimating motion trajectories of pixels in a video object from frame to frame in a video sequence;

performing a temporal wavelet transform on the corresponding pixels along the motion trajectories in a temporal direction to produce frames of temporal wavelet coefficients;

performing a spatial wavelet transform on the frames of the temporal wavelet coefficients to produce multiple sub-bands of wavelet coefficients; and

coding each sub-band of wavelet coefficients independently bit-plane by bit-plane using different coding primitives, wherein the coding primitives comprise:

zero coding to code new information about a wavelet coefficient that is not yet significant in a previous bit-plane; and

sign coding to code a sign of the wavelet coefficient once the wavelet coefficient is deemed significant.

18. **(Original)** A method as recited in claim 17, wherein the estimating comprises matching corresponding pixels in the video object from frame to frame in the video sequence.

19. **(Original)** A method as recited in claim 17, wherein the temporal and spatial wavelet transforms comprise a shape-adaptive discrete wavelet transform.

20. **(Once Amended)** A method ~~as recited in claim 17,~~ comprising:

estimating motion trajectories of pixels in a video object from frame to frame in a video sequence;

performing a temporal wavelet transform on the corresponding pixels along the motion trajectories in a temporal direction to produce frames of temporal wavelet coefficients;

performing a spatial wavelet transform on the frames of the temporal wavelet coefficients to produce multiple sub-bands of wavelet coefficients;

coding each sub-band of wavelet coefficients independently; and

wherein the performing a temporal wavelet transform comprises:

forming a pixel array containing pixels that continue from frame to frame in the video sequence;

examining a pixel in a frame to determine whether the pixel is a terminating pixel that does not continue to a next frame;

if the pixel is a terminating pixel, terminating the pixel array; and

if the pixel is not a terminating pixel, adding the pixel to the pixel array.

21. **(Original)** A method as recited in claim 20, further comprising transforming the pixels arrays to produce the frames of temporal wavelet coefficients.

22. **(Original)** A method as recited in claim 17, wherein the coding comprises transposing selected sub-bands to reduce a number of sub-bands to be coded.

23. **(Original)** A method as recited in claim 17, wherein the coding comprises:

coding the wavelet coefficients in bit-planes; and

allocating bits for the bit-planes according to a rate-distortion optimization.

24. **(Original)** A method as recited in claim 17, further comprising truncating bits allocated to a bit-plane at a point on a rate-distortion curve that approximates a convex hull.

25. **(Canceled)**

26. **(Canceled)**

27. **(Once Amended)** A method ~~as recited in claim 25,~~ comprising:

estimating motion trajectories of pixels in a video object from frame to frame in a video sequence;

performing a temporal wavelet transform on the corresponding pixels along the motion trajectories in a temporal direction to produce frames of temporal wavelet coefficients;

performing a spatial wavelet transform on the frames of the temporal wavelet coefficients to produce multiple sub-bands of wavelet coefficients; and

coding each sub-band of wavelet coefficients independently bit-plane by bit-plane using different coding primitives, wherein the coding primitives comprise:

zero coding to code new information about a wavelet coefficient that is not yet significant in a previous bit-plane;

sign coding to code a sign of the wavelet coefficient once the wavelet coefficient is deemed significant; and

magnitude refinement to code new information of a wavelet coefficient that has already become significant in the previous bit-plane.

28. **(Original)** A method as recited in claim 17, wherein the coding produces multiple bitstreams for corresponding sub-bands of wavelet coefficients and further comprising constructing a multi-layer bitstream from the multiple bitstreams.

29. **(Original)** A method as recited in claim 17, wherein the coding comprises assigning contexts to the wavelet coefficients of each sub-band based on numbers of significant neighboring samples.

30. (Original) A computer-readable medium comprising computer-executable instructions that, when executed by one or more processors, perform the method as recited in claim 17.

31. (Previously Canceled)

32. (Previously Canceled)

33. (Previously Canceled)

34. (Previously Canceled)

35. (Previously Canceled)

36. (Once Amended) A method comprising:

coding sub-bands of coefficients produced from transforming video frames in an independent manner such that one sub-band of coefficients is coded independently of another sub-band of coefficients; ~~and~~

constructing a bitstream from the independently coded sub-bands; and

wherein the coefficients of each sub-band are coded bit-plane by bit-plane using different coding primitives, wherein the coding primitives comprise:

zero coding to code new information about a coefficient that is not yet significant in a previous bit-plane; and

sign coding to code a sign of the coefficient once the coefficient is deemed significant.

37. (Original) A method as recited in claim 36, wherein the coding comprises transposing selected sub-bands prior to said coding.

38. (Canceled)

39. (Canceled)

40. (Once Amended) A method ~~as recited in claim 38,~~ comprising:

coding sub-bands of coefficients produced from transforming video frames in an independent manner such that one sub-band of coefficients is coded independently of another sub-band of coefficients;

constructing a bitstream from the independently coded sub-bands; and

wherein the coefficients of each sub-band are coded bit-plane by bit-plane using different coding primitives, wherein the coding primitives comprise:

zero coding to code new information about a coefficient that is not yet significant in a previous bit-plane;

sign coding to code a sign of the coefficient once the coefficient is deemed significant; and

magnitude refinement to code new information of a coefficient that has already become significant in the previous bit-plane.

41. **(Original)** A method as recited in claim 36, wherein the coding comprises assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples.

42. **(Once Amended)** A method ~~as recited in claim 41~~, comprising:

coding sub-bands of coefficients produced from transforming video frames in an independent manner such that one sub-band of coefficients is coded independently of another sub-band of coefficients;

constructing a bitstream from the independently coded sub-bands;

wherein the coding comprises assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples; and

wherein the sub-bands include an LLL (low-low-low) sub-band and an LLH (low-low-high) sub-band and the contexts are assigned as follows:

LLL and LLH Sub-bands				
h	**v**	**a**	**d**	**Context**
2	x	x	x	0
1	≥1	x	x	0
1	0	≥1	x	1
1	0	0	x	2
0	2	0	x	3
0	1	0	x	4
0	0	≥1	x	5
0	0	0	3	6
0	0	0	2	7
0	0	0	1	8
0	0	0	0	9

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors

that are significant and 0<v<2, "a" represents a number of immediate temporal neighbors that are significant and 0<a<2, and "d" represents a number of immediate diagonal neighbors that are significant and 0<d<12.

43. **(Once Amended)** A method ~~as recited in claim 41,~~ comprising:

coding sub-bands of coefficients produced from transforming video frames in an independent manner such that one sub-band of coefficients is coded independently of another sub-band of coefficients;

constructing a bitstream from the independently coded sub-bands;

wherein the coding comprises assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples; and

wherein the sub-bands include an LHH (low-high-high) sub-band and the contexts are assigned as follows:

LHH Sub-band			
h	**v+a**	**d**	**Context**
2	x	x	0
1	≥3	x	0
1	≥1	≥4	1
1	≥1	x	2
1	0	≥4	3
1	0	x	4
0	≥3	x	5
0	≥1	≥4	6
0	≥1	x	7
0	0	≥4	8
0	0	x	9

where "h" represents a number of immediate horizontal neighbors that are significant and 0<h<2, "v" represents a number of immediate vertical neighbors

that are significant and 0<v<2, "a" represents a number of immediate temporal neighbors that are significant and 0<a<2, and "d" represents a number of immediate diagonal neighbors that are significant and 0<d<12.

44. **(Once Amended)** A method ~~as recited in claim 41,~~ comprising:

coding sub-bands of coefficients produced from transforming video frames in an independent manner such that one sub-band of coefficients is coded independently of another sub-band of coefficients;

constructing a bitstream from the independently coded sub-bands;

wherein the coding comprises assigning contexts to the coefficients of each sub-band based on numbers of significant neighboring samples; and

wherein the sub-bands include an HHH (high-high-high) sub-band and the contexts are assigned as follows:

d	h+v+a	Context
≥6	x	0
≥4	≥3	1
≥4	x	2
≥2	≥4	3
≥2	≥2	4
≥2	x	5
≥0	≥4	6
≥0	≥2	7
≥0	1	8
≥0	0	9

where "h" represents a number of immediate horizontal neighbors that are significant and 0<h<2, "v" represents a number of immediate vertical neighbors that are significant and 0<v<2, "a" represents a number of immediate temporal

neighbors that are significant and $0<a<2$, and "d" represents a number of immediate diagonal neighbors that are significant and $0<d<12$.

45. (Original) A method as recited in claim 36, wherein the constructing comprises forming multiple bit-planes and truncating a number of bits in each bit-plane according to a rate-distortion curve.

46. (Original) A computer-readable medium comprising computer-executable instructions that, when executed by one or more processors, perform the method as recited in claim 36.

47. (Cancelled)

48. (Cancelled)

49. (Cancelled)

50. (Cancelled)

51. (Cancelled)

52. (Cancelled)

53. (Cancelled)

54. (Canceled)

55. (Canceled)

56. (Canceled)

57. (Canceled)

58. (Canceled)

59. (Canceled)

60. (Canceled)

61. (Canceled)

62. (Once Amended) A video encoder ~~as recited in claim 61,~~ comprising:

a wavelet transformer to transform frames in a video sequence into multiple sub-bands of coefficients, the wavelet transform using motion information of video objects in the frames;

a coder to code the coefficients of each sub-band independently, the coder comprising a context-based arithmetic coder to assign contexts to the coefficients of each sub-band based on different coding primitives; and

wherein the sub-bands include an LLL (low-low-low) sub-band and an LLH (low-low-high) sub-band and the coder employs a zero coding primitive to code new information about a coefficient that is not yet significant in a previous bit-plane by assigning the contexts as follows:

LLL and LLH Sub-bands				
h	**v**	**a**	**d**	**Context**
2	x	x	x	0
1	≥1	x	x	0
1	0	≥1	x	1
1	0	0	x	2
0	2	0	x	3
0	1	0	x	4
0	0	≥1	x	5
0	0	0	3	6
0	0	0	2	7
0	0	0	1	8
0	0	0	0	9

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors that are significant and $0<v<2$, "a" represents a number of immediate temporal neighbors that are significant and $0<a<2$, and "d" represents a number of immediate diagonal neighbors that are significant and $0<d<12$.

63. (Once Amended) A video encoder ~~as recited in claim 61~~, comprising:

a wavelet transformer to transform frames in a video sequence into multiple sub-bands of coefficients, the wavelet transform using motion information of video objects in the frames;

a coder to code the coefficients of each sub-band independently, the coder comprising a context-based arithmetic coder to assign contexts to the coefficients of each sub-band based on different coding primitives; and

wherein the sub-bands include an LHH (low-high-high) sub-band and the coder employs a zero coding primitive to code new information about a coefficient that is not yet significant in a previous bit-plane by assigning the contexts as follows:

LHH Sub-band			
h	**v+a**	**d**	**Context**
2	x	x	0
1	≥3	x	0
1	≥1	≥4	1
1	≥1	x	2
1	0	≥4	3
1	0	x	4
0	≥3	x	5
0	≥1	≥4	6
0	≥1	x	7
0	0	≥4	8
0	0	x	9

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors that are significant and $0<v<2$, "a" represents a number of immediate temporal neighbors that are significant and $0<a<2$, and "d" represents a number of immediate diagonal neighbors that are significant and $0<d<12$.

64. **(Once Amended)** A video encoder ~~as recited in claim 61,~~ comprising:

a wavelet transformer to transform frames in a video sequence into multiple sub-bands of coefficients, the wavelet transform using motion information of video objects in the frames;

a coder to code the coefficients of each sub-band independently, the coder comprising a context-based arithmetic coder to assign contexts to the coefficients of each sub-band based on different coding primitives; and

wherein the sub-bands include an HHH (high-high-high) sub-band and the coder employs a zero coding primitive to code new information about a coefficient that is not yet significant in a previous bit-plane by assigning the contexts as follows:

d	h+v+a	Context
≥6	x	0
≥4	≥3	1
≥4	x	2
≥2	≥4	3
≥2	≥2	4
≥2	x	5
≥0	≥4	6
≥0	≥2	7
≥0	1	8
≥0	0	9

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors that are significant and $0<v<2$, "a" represents a number of immediate temporal

neighbors that are significant and 0<a<2, and "d" represents a number of immediate diagonal neighbors that are significant and 0<d<12.

65. (Once Amended) A video encoder ~~as recited in claim 61,~~ comprising:

a wavelet transformer to transform frames in a video sequence into multiple sub-bands of coefficients, the wavelet transform using motion information of video objects in the frames;

a coder to code the coefficients of each sub-band independently, the coder comprising a context-based arithmetic coder to assign contexts to the coefficients of each sub-band based on different coding primitives; and

wherein the coder employs a sign coding primitive to code a sign of the coefficient once the coefficient is deemed significant by assigning the contexts as follows:

h=-1			
v	a	$\hat{x}$	Context
-1	-1	0	0
-1	0	0	1
-1	1	0	2
0	-1	0	3
0	0	0	4
0	1	0	5
1	-1	0	6
1	0	0	7
1	1	0	8

H=0			
v	a	$\hat{x}$	Context
-1	-1	0	9
-1	0	0	10
-1	1	0	11
0	-1	0	12
0	0	0	13
0	1	1	12
1	-1	1	11
1	0	1	10
1	1	1	9

h=1			
v	a	$\hat{x}$	Context
-1	-1	1	8
-1	0	1	7
-1	1	1	6
0	-1	1	5
0	0	1	4
0	1	1	3
1	-1	1	2
1	0	1	1
1	1	1	0

where "h" represents a number of immediate horizontal neighbors that are significant and $0<h<2$, "v" represents a number of immediate vertical neighbors that are significant and $0<v<2$, "a" represents a number of immediate temporal neighbors that are significant and $0<a<2$, and $\hat{x}$ is a sign symbol prediction in a given context.

66. (Canceled)

67. (Canceled)

68. (Canceled)

69. (Canceled)

70. (Canceled)

71. **(Once Amended)** A video encoder ~~as recited in claim 68,~~ comprising:

means for estimating motion trajectories of pixels in a video object from frame to frame in a video sequence;

means for performing a temporal wavelet transform on the corresponding pixels along the motion trajectories in a temporal direction to produce frames of temporal wavelet coefficients;

means for performing a spatial wavelet transform on the frames of the temporal wavelet coefficients to produce multiple sub-bands of wavelet coefficients;

means for coding each sub-band of wavelet coefficients independently; and

wherein the means for performing a temporal wavelet transform comprises:

means for forming a pixel array containing pixels that continue from frame to frame in the video sequence;

means for examining a pixel in a frame to determine whether the pixel is a terminating pixel that does not continue to a next frame;

if the pixel is a terminating pixel, means for terminating the pixel array; and

if the pixel is not a terminating pixel, means for adding the pixel to the pixel array.

72. **(Canceled)**

73. **(Canceled)**

74. (Canceled)

75. (Canceled)

76. (Canceled)

77. (Canceled)

78. (Canceled)

79. (Canceled)

80. (Canceled)

81. (Canceled)

82. (Canceled)